

I (WE) CLAIM:

1. A system for calibration of an ultrasound transmitter and/or receiver, the system comprising:
 - at least one of an ultrasound transmit and receive path;
 - a first clipping diode connected with the path;
 - a first voltage source connectable with the first clipping diode; and
 - a first switch between the first clipping diode and the first voltage source.
2. The system of Claim 1 wherein the at least one of the ultrasound transmit and receive path comprises an ultrasound transmit and receiver path.
3. The system of Claim 1 wherein the path comprises a conductor connected between an amplifier and a transducer.
4. The system of Claim 1 wherein the first voltage source comprises a positive voltage source;
 - further comprising:
 - a second clipping diode connected with the path;
 - a second voltage source comprising a negative voltage source, the second voltage source connectable with the second clipping diode; and
 - a second switch between the second clipping diode and the second voltage source.
5. The system of Claim 1 further comprising:
 - a plurality of separate ultrasound paths including the at least one path; and
 - additional clipping diodes connectable in parallel with the first voltage source and respective ones of the plurality of separate ultrasound paths;
 - wherein the first switch connects with each of the additional clipping diodes.

6. The system of Claim 1 wherein the first switch comprises a double pole relay.
7. The system of Claim 1 wherein the path comprises a transmit path;
further comprising:
an analog-to-digital converter connected with the first switch, the first switch operable to select between connecting the first clipping diode with the first voltage source for transmit operation and with the analog-to-digital converter for calibration operation.
8. The system of Claim 1 wherein the path comprises a receive path;
further comprising:
a current source connected with the first switch, the first switch operable to select between connecting the first clipping diode with the first voltage source for receive operation and with the current source for calibration operation.
9. A system for calibration of an ultrasound transmitter and receiver, the system comprising:
a plurality of transmit/receive ultrasound paths;
a plurality of pairs of clipping diodes, each of the pairs of clipping diodes connected with a respective one of the transmit/receive ultrasound paths;
a positive voltage source connectable with a first one of the clipping diodes of each pair of clipping diodes;
a negative voltage source connectable with a second one of the clipping diodes of each pair of clipping diodes;
a first switch between the first ones of the clipping diodes and the positive voltage source; and
a second switch between the second ones of the clipping diodes and the negative voltage source.

10. The system of Claim 9 further comprising:
an amplifier having an input connectable with the first and second switches;
a resistor connected between the input and a ground; and
an analog-to-digital converter connected with an output of the amplifier.
11. The system of Claim 9 further comprising:
a current source connectable with the first and second switches.
12. A method for calibration of an ultrasound transmitter and/or receiver, the method comprising:
 - (a) measuring at least one of phase and amplitude with a signal provided through a clipping diode; and
 - (b) calibrating the ultrasound transmitter and/or receiver as a function of the at least one of phase and amplitude.
13. The method of Claim 12 further comprising:
 - (c) connecting the clipping diode with a high voltage;
 - (d) operating a transmit/receive path connected with the clipping diode in an imaging mode while the clipping diode is connected with the high voltage; and
 - (e) disconnecting the clipping diode from the high voltage;wherein (a) and (b) are performed while the clipping diode is disconnected.
14. The method of Claim 12 further comprising:
 - (c) limiting an output voltage of the ultrasound transmitter with the clipping diode.
15. The method of Claim 14 wherein (c) comprises limiting the output voltage between a positive and negative voltage with the clipping diode and an additional clipping diode, wherein (a) the at least one of phase and amplitude is responsive to the signal through the clipping diode and an additional signal through the additional clipping diode.

16. The method of Claim 12 further comprising:

(c) generating a transmit waveform on a transmit path, the signal through the clipping diode responsive to the transmit waveform.

17. The method of Claim 16 wherein (a) and (c) are performed sequentially for each of at least two different transmit paths, wherein (b) comprises adjusting one of a phase and amplitude characteristic of one of the two different transmit paths relative to the other of the two different transmit paths during imaging operation.

17. The method of Claim 12 wherein (a) comprises converting the signal from analog-to-digital.

18. The method of Claim 12 further comprising:

(c) generating the signal with a current source connected with the clipping diode;

wherein (a) comprises measuring the signal on an ultrasound receive path.

19. The method of Claim 18 wherein (a) and (c) are performed sequentially for each of at least two different receive paths, wherein (b) comprises adjusting one of a phase and amplitude characteristic of one of the two different receive paths relative to the other of the two different receive paths during imaging operation.

20. In a method for calibrating a transmit/receive path of an ultrasound system wherein clipping diodes limit an output voltage of the transmit/receive path, an improvement comprising:

using the clipping diodes as a calibration node for the transmit/receive path.

21. The system of Claim 4 further comprising:

first and second current sources;

wherein the first switch selectably connects the first clipping diode with one of the first current source and the first voltage source and wherein the second

switch selectably connects the second clipping diode with one of the second current source and the second voltage source.

22. The system of Claim 9 further comprising:
- first and second current sources;
 - a transmit calibration circuit connected to a common node;
 - a receive calibration circuit connected to the common node;
 - wherein the first switch selectably connects the first one of the clipping diodes with one of the first current source and the positive voltage source; and
 - wherein the second switch selectably connects the second one of the clipping diode with one of the second current source and the negative voltage source, the second switch connectable with the common node.